

Indiana Department of Environmental Management
Exceptional Events Request
for
July 4, 2007

Parameter: PM_{2.5}

Locations: Elkhart – Pierre Moran Jr. High School
South Bend – Nuner School
Fort Wayne – Beacon St.

Date: July 4, 2007

Source: Most communities have a tradition of celebrating the Fourth of July with several activities throughout the day ending with huge fireworks displays in the evening. Unfortunately, this traditional celebration may have a short term impact on air quality especially if meteorological conditions are such that dispersion of the smoke plumes from these events are hindered. The short term effects typically last 2 - 6 hours and depending on the meteorological conditions and duration, can substantially impact the particulate loading of PM_{2.5} samples. In the State of Indiana, three sites in different communities experienced significantly high PM_{2.5} 24-hour concentrations on this date.

Exceptional
Events

Criteria: EPA defines an “exceptional event” as an unusual or naturally occurring event that can affect air quality but is not reasonably controllable by state and local agencies. Exceptional events are events for which the normal planning and regulatory process established by the clean air act are not appropriate. Emissions from fireworks are treated in the same manner as an “exceptional event”. The following discussion illustrates that the three sites in question were influenced by local fireworks and the data should be excluded. Indiana has flagged the data with the ‘IH’ flag in AQS, and is awaiting concurrence from EPA.

Data: Different analyses of the data are used to demonstrate that the PM_{2.5} concentrations measured on July 4, 2007 were influenced by local fireworks displays. Table 1 shows daily PM_{2.5} averages prior to, during and after the event with the values flagged in **bold**.

Tables 2 and 3 list summaries of the data collected at all three sites since 2000. Data from 2007 are calculated with all current data and with the flagged data removed. There is a significant improvement in both the 98th percentile and annual average design values at Elkhart (18-039-0003) and an improvement in the annual averages for all three sites. Please note that the calculated values for the removed data do not include other values flagged as exceptional events that are awaiting concurrence from EPA.

**Table 1 - FRM Daily Values
Exceptional Event Period**

Values in **BOLD** are flagged as exceptional events

Date	Elkhart – P. Moran 18-039-0003	South Bend - Nuner 18-141-0014	Ft. Wayne – Beacon 18-003-0004
7/2/07	-	6.4	7.2
7/3/07	-	16.6	11.9
7/4/07	70.6	39	34.3
7/5/07	23	21.1	11
7/6/07	12.8	11.9	9.6

Table 2 - Historical Daily Values

		Elkhart – P. Moran 18-039-0003		South Bend - Nuner 18-141-0014		Ft. Wayne – Beacon 18-003-0004	
Year		98th %ile	Daily Design Value ¹	98th %ile	Daily Design Value ¹	98th %ile	Daily Design Value ¹
2000		38.6		29.5		34.5	
2001		37.5		34.5		32	
2002	2000-2002	35.2	37	31.7	32	32.1	33
2003	2001-2003	36.7	36	35	34	34.6	33
2004	2002-2004	31.4	34	26.7	31	31	33
2005	2003-2005	40.8	36	40.2	34	38.4	35
2006	2004-2006	25.5	33	26	31	26.2	32
2007	2005-2007	34.6	34	33.8	33	33.7	33
		Values excluding flagged data					
2007	2005-2007	33.2	33	33.8	33	33	33

¹Daily Design Value = 3 year average of annual 98th %ile values.

Table 3 - Historical Annual Averages

		Elkhart – P. Moran 18-039-0003		South Bend - Nuner 18-141-0014		Ft. Wayne – Beacon 18-003-0004	
Year		Annual Ave.	Annual Design Value ¹	Annual Ave.	Annual Design Value ¹	Annual Ave.	Annual Design Value ¹
2000		15.7		13.8		15.7	
2001		15.7		14		14.3	
2002	2000-2002	15	15.5	14.3	14	14.6	14.8
2003	2001-2003	14.9	15.2	13.8	14	14.1	14.3
2004	2002-2004	13.3	14.4	12.3	13.5	12.5	13.7
2005	2003-2005	15.6	14.6	14.8	13.7	15.6	14.1
2006	2004-2006	12.6	13.8	12.4	13.2	11.9	13.4
2007	2005-2007	13.8	14	12.9	13.4	13.2	13.6
		Values excluding flagged data					
2007	2005-2007	13.5	13.9	12.8	13.4	13.1	13.6

²Annual Design value = 3 year average of the annual averages.

Event

Discussion: Hourly Data

Hourly concentrations of PM_{2.5} are available from the Fort Wayne – Beacon St. site. The data show high hourly concentrations influencing the PM_{2.5} sample being collected. The day was mostly influenced from the evening hours when measured concentrations were around 150 ug/m³ when the city's fireworks display took place. The influence of individuals' fireworks can be seen beginning on the evening of July 3 and throughout the day of July 4. The influence tapers off early on the morning of July 5. Table 4 lists the hourly data collected at the site on July 3 – 5.

Table 4 – Fort Wayne Hourly Data

Start Hour (EST)	Day		
	7/3	7/4	7/5
00	7.8	35.5	38.1
01	7.3	32.4	10
02	9.4	30.2	9
03	9.8	29.5	10.2
04	9.8	31.2	11.5
05	10.2	31.4	11.1
06	11	32.2	8.1
07	13.4	32	10.7
08	15.9	33	12.7
09	13.8	32.3	9.5
10	9.8	24.2	8.7
11	10.7	19.2	15.4
12	9.9	19.9	7.5
13	10	21	7.1
14	10.5	24.8	16
15	10.5	24	12.9
16	12.8	22.5	11
17	14.8	20.8	8
18	15.3	20.8	9.3
19	14.7	21.3	9.9
20	18.3	36.3	8.7
21	32	78.2	10.5
22	41.5	145.1	9.3
23	42.9	151	12.1

Similarly high values hourly values were recorded at the South Bend - Shields Dr. site. Even though Shields Drive is approximately three (3) miles north of the South Bend - Nuner site, hourly data reported there shows the same rise of PM_{2.5} values on the evening of July 3, the values peaking on the evening/night of July 4, and high values continuing through July 5. Table 5 lists the data during this period.

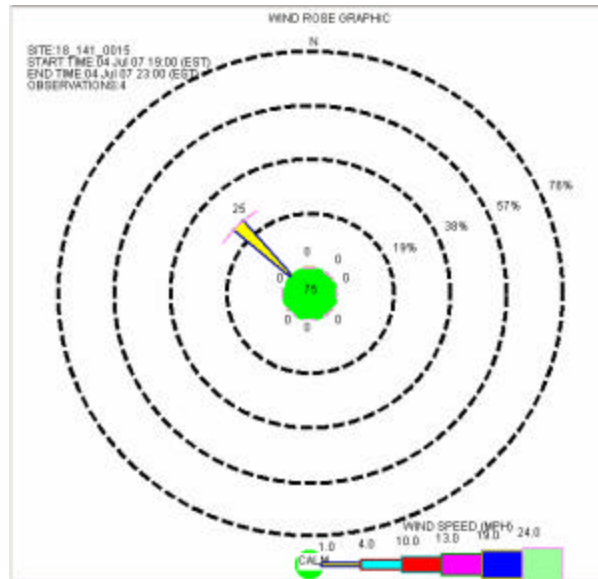
Table 5 – South Bend Hourly Data

Start Hour (EST)	Day		
	7/3	7/4	7/5
00	7.1	26.2	247.7
01	15.8	21.1	221.9
02	11.4	25.4	136.4
03	12.8	28.9	43.2
04	17.7	25.7	40.0
05	10.4	15.9	30.4
06	16.6	4.5	25.1
07	10.8	33.7	32.4
08	11.4	35.7	46.6
09	12.0	31.6	60.7
10	11.9	27.4	56.7
11	13.3	14.6	29.3
12	13.5	13.9	18.1
13	14.1	21.3	18.3
14	26.1	10.5	16.2
15	17.6	12.9	14.7
16	19.8	13.4	16.2
17	17.7	12.5	14.4
18	16.3	15.6	13.0
19	15.0	11.5	12.7
20	19.9	10.0	13.9
21	20.4	25.5	18.3
22	33.4	162.3	28.8
23	27.1	371.0	19.8

No hourly data are available from Elkhart.

Meteorological Conditions

The wind rose in Figure 1 displays the wind speed and direction data from South Bend – Shields Dr. during the evening of July 4. The wind rose is indicative of conditions which occurred across northern Indiana at this time. The wind rose illustrates the calm wind conditions that were occurring during the time period of the large fireworks displays. Because there was very little wind during this time period, particulate matter in the air was not able to be dispersed or carried away from the cities quickly, therefore resulting in high values of PM_{2.5} being recorded.



**Figure 1 – Wind Rose for July 4, 2007 (7 – 11pm EST)
 South Bend – Shields Dr.**

Conclusion: EPA defines an “exceptional event” as an unusual or naturally occurring event that can affect air quality but is not reasonably controllable by state and local agencies. Exceptional events are events for which the normal planning and regulatory process established by the clean air act is not appropriate. Indiana has illustrated through the use of hourly data and meteorological conditions that the large fireworks displays impacted the Elkhart, South Bend and Ft. Wayne communities on July 4, 2007 causing exceedances of the PM_{2.5} 24-hour standard and significantly increasing the annual average. According to 40 CFR Part 50.14 (b)(2), “EPA shall exclude data from use in determinations of exceedances and NAAQS violations where a State demonstrates to EPA’s satisfaction that emissions from fireworks displays caused a specific air pollution concentration in excess of one or more national ambient air quality standards at a particular air quality monitoring location ...” IDEM believes they have successfully illustrated the impact of this event on these sites.

Therefore, IDEM requests that EPA concur with the ‘IH’ flag on the data in AQS for the data in **bold** in Table 1.

Review and

Comment: Proposed Exceptional Events Requests are posted on the IDEM website for review and comment for thirty (30) days.

Comments can be emailed to

Steve Lengerich (slengeri@idem.in.gov)

or mailed to

Steve Lengerich
100 North Senate Avenue
MC 61-50-2 Shadeland
Indianapolis, IN 46204-2251

or faxed to

317-308-3239